

What is claimed is:

1. An information handling system for mirroring data, comprising:

source data storage for storing and updating data;

first intermediate data storage for storing data, said first intermediate data storage

5 associated with said source data storage;

target data storage for storing data;

second intermediate data storage for storing data, said second intermediate data storage

associated with said target data storage; and

mirroring control conducting first cyclic incremental flashcopy of said source data

10 storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency

point, said first cyclic incremental flashcopy copied to said first intermediate data storage and

synchronously mirrored to said second intermediate data storage; and conducting a second cyclic

incremental flashcopy of said second intermediate data storage to said target data storage, said

second cyclic incremental flashcopy beginning in response to completion of said first cyclic

15 incremental flashcopy; the beginning of said second cyclic incremental flashcopy comprising

commit of said consistency point.

2. The information handling system of Claim 1, wherein said mirroring control additionally

comprises a loop representing said commit of said consistency point, initiating another first

cyclic incremental flashcopy of said source data storage in response to said commit of said

20 consistency point.

3. The information handling system of Claim 2, wherein said mirroring control additionally responds to an update write for said source data storage, determining whether data of said source data storage to be overwritten by said update write is present at said first intermediate data storage and said second intermediate data storage; if so, allowing said update write to be written
5 to said source data storage, and indicating said update write in a future flashcopy map.

4. The information handling system of Claim 3, wherein said mirroring control employs said future flashcopy map for conducting the next first cyclic incremental flashcopy of said source data storage.

5. The information handling system of Claim 4, wherein said mirroring control conducts
10 said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control, in response to completion of mirroring of said grains indicated by said commit of said consistency point, updates said first flashcopy map with said future flashcopy map.

6. The information handling system of Claim 4, wherein said mirroring control conducts
15 said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control merges said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and resets said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point.

7. The information handling system of Claim 1, wherein said target data storage and said second intermediate data storage are remotely located with respect to locally located said source data storage and said first intermediate data storage; and additionally comprising at least one interface at said target data storage and said second intermediate data storage; and at least one
5 interface at said source data storage and said first intermediate data storage; said interfaces for interfacing with communication systems for communicating between said remote and local locations.

8. An information handling system for providing data for mirroring a source data storage to a target data storage, comprising:

said source data storage for storing and updating data;

first intermediate data storage for storing data, said first intermediate data storage

5 associated with said source data storage; and

mirroring control conducting first cyclic incremental flashcopy of said source data

storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency

point, said first cyclic incremental flashcopy copied to said first intermediate data storage and

synchronously mirrored to a second intermediate data storage for storing data, said second

10 intermediate data storage associated with said target data storage; and, a loop initiating another

first cyclic incremental flashcopy of said source data storage in response to a commit of said

consistency point; wherein said commit of said consistency point comprises the beginning of a

second cyclic incremental flashcopy of said second intermediate data storage to said target data

storage, said second cyclic incremental flashcopy beginning in response to completion of said

15 first cyclic incremental flashcopy.

9. The information handling system of Claim 8, wherein said mirroring control additionally

responds to an update write for said source data storage, determining whether data of said source

data storage to be overwritten by said update write is present at said first intermediate data

storage and said second intermediate data storage; if so, allowing said update write to be written

20 to said source data storage, and indicating said update write in a future flashcopy map.

10. The information handling system of Claim 9, wherein said mirroring control employs said future flashcopy map for conducting the next first cyclic incremental flashcopy of said source data storage.

11. The information handling system of Claim 10, wherein said first cyclic incremental
5 flashcopy conducted by said mirroring control employs a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, in response to completion of mirroring of said grains indicated by said commit of said consistency point, updating said first flashcopy map with said future flashcopy map.

12. The information handling system of Claim 10, wherein said mirroring control conducts
10 said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control merges said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and resets said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point.

13. The information handling system of Claim 8, wherein said target data storage and said second intermediate data storage are remotely located with respect to locally located said source data storage and said first intermediate data storage; and additionally comprising at least one interface at said target data storage and said second intermediate data storage for interfacing said mirroring control and said source data storage with at least one communication system for communicating between said remote and local locations.

14. A method for mirroring data of updatable source data storage to target data storage, said source data storage for storing and updating data, comprising the steps of:

conducting first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point;

5 said first cyclic incremental flashcopy copied to a first intermediate data storage and synchronously mirrored to a second intermediate data storage; and

conducting a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy; the beginning of said second

10 cyclic incremental flashcopy comprising commit of said consistency point.

15. A method for mirroring data of updatable source data storage to target data storage, said source data storage for storing and updating data, comprising the steps of:

conducting first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point;

5 said first cyclic incremental flashcopy copied to a first intermediate data storage and synchronously mirrored to a second intermediate data storage;

a loop initiating another first cyclic incremental flashcopy of said source data storage in response to a commit of said consistency point; wherein said commit of said consistency point comprises the beginning of a second cyclic incremental flashcopy of said second intermediate
10 data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy.

16. The method of Claim 15, additionally comprising the steps of:

in response to an update write for said source data storage, determining whether data of said source data storage to be overwritten by said update write is present at said synchronously
15 mirrored first intermediate data storage and said second intermediate data storage;

if so, allowing said update write to be written to said source data storage, and indicating said update write in a future flashcopy map.

17. The method of Claim 16, wherein said future flashcopy map is employed in said step of conducting a first cyclic incremental flashcopy for the next first cyclic incremental flashcopy of
20 said source data storage.

18. The method of Claim 17, wherein said first cyclic incremental flashcopy step employs a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and additionally comprises the step of, in response to completion of mirroring of said grains indicated by said commit of said consistency point, updating said first flashcopy map
5 with said future flashcopy map; to thereby employ said updated first flashcopy map in said step of conducting a first cyclic incremental flashcopy for the next first cyclic incremental flashcopy of said source data storage.

19. The method of Claim 17, wherein said first cyclic incremental flashcopy step employs a first flashcopy map indicating required, and not completed, mirroring of grains of said source
10 data storage, and additionally comprises the step of merging said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and resetting said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point.

20. A computer program product usable with at least one programmable computer processor having computer readable code embodied therein, said at least one programmable computer processor for controlling mirroring data of updatable source data storage to target data storage, said computer program product comprising:

5 computer readable program code causing said at least one programmable computer processor to conducting first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point; said first cyclic incremental flashcopy copied to a first intermediate data storage and synchronously mirrored to a second intermediate data storage; and

10 computer readable program code causing said at least one programmable computer processor to conduct a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy; the beginning of said second cyclic incremental flashcopy comprising commit of said consistency point.

21. A computer program product usable with at least one programmable computer processor having computer readable code embodied therein, said at least one programmable computer processor for controlling mirroring data of updatable source data storage to target data storage, said computer program product comprising:

- 5 computer readable program code causing said at least one programmable computer processor to conduct first cyclic incremental flashcopy of said source data storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point; said first cyclic incremental flashcopy copied to a first intermediate data storage and synchronously mirrored to a second intermediate data storage; and
- 10 computer readable program code causing said at least one programmable computer processor to conduct a loop initiating another first cyclic incremental flashcopy of said source data storage in response to a commit of said consistency point; wherein said commit of said consistency point comprises the beginning of a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental
- 15 flashcopy beginning in response to completion of said first cyclic incremental flashcopy.

22. The computer program product of Claim 21, additionally comprising computer readable program code causing said at least one programmable computer processor to:

in response to an update write for said source data storage, determine whether data of said source data storage to be overwritten by said update write is present at said synchronously mirrored first intermediate data storage and said second intermediate data storage;

if so, allow said update write to be written to said source data storage, and indicate said
5 update write in a future flashcopy map.

23. The computer program product of Claim 22, wherein said computer readable program code causing said at least one programmable computer processor to conduct said first cyclic incremental flashcopy of said data storage, employs said future flashcopy map for conducting said first cyclic incremental flashcopy for the next first cyclic incremental flashcopy of said
10 source data storage.

24. The computer program product of Claim 23, wherein said computer readable program code causing said at least one programmable computer processor to conduct said first cyclic incremental flashcopy of said data storage, employs a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage; and
15 said computer program product additionally comprising computer readable program code causing said at least one programmable computer processor to, in response to completion of mirroring of said grains indicated by said commit of said consistency point, update said first flashcopy map with said future flashcopy map; to thereby employ said updated first flashcopy map in said step of conducting a first cyclic incremental flashcopy for the next first cyclic
20 incremental flashcopy of said source data storage.

25. The computer program product of Claim 23, wherein said computer readable program code causing said at least one programmable computer processor to conduct said first cyclic incremental flashcopy of said data storage, employs a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage; and

5 said computer program product additionally comprising computer readable program code causing said at least one programmable computer processor to merge said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and reset said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point.

26. A mirroring controller for controlling mirroring data of updatable source data storage to target data storage, said source data storage for storing and updating data; said mirroring controller comprising:

mirroring control conducting first cyclic incremental flashcopy of said source data

5 storage, the beginning of each said first cyclic incremental flashcopy comprising a consistency point, said first cyclic incremental flashcopy copied to a first intermediate data storage for storing data; and synchronously mirrored to a second intermediate data storage for storing data; and, conducting a loop initiating another first cyclic incremental flashcopy of said source data storage in response to a commit of said consistency point; wherein said commit of said consistency point
10 comprises the beginning of a second cyclic incremental flashcopy of said second intermediate data storage to said target data storage, said second cyclic incremental flashcopy beginning in response to completion of said first cyclic incremental flashcopy.

27. The mirroring controller of Claim 26, wherein said mirroring control additionally responds to an update write for said source data storage, determining whether data of said source
15 data storage to be overwritten by said update write is present at said first intermediate data storage and said second intermediate data storage; if so, allowing said update write to be written to said source data storage, and indicating said update write in a future flashcopy map.

28. The mirroring controller of Claim 27, wherein said mirroring control employs said future flashcopy map for conducting the next first cyclic incremental flashcopy of said source data
20 storage.

29. The mirroring controller of Claim 28, wherein said mirroring control conducts said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control, in response to completion of mirroring of said grains indicated by said commit of said consistency point, updates said first flashcopy map with said future flashcopy map.

30. The mirroring controller of Claim 28, wherein said mirroring control conducts said first cyclic incremental flashcopy employing a first flashcopy map indicating required, and not completed, mirroring of grains of said source data storage, and, said mirroring control merges said first flashcopy map with said future flashcopy map to generate a new first flashcopy map, and resets said future flashcopy map; the beginning of a new first cyclic incremental flashcopy comprising a consistency point.